A.D. 1867, 19*th* OCTOBER. N° 2943.

Corks or Stoppers.

LETTERS PATENT to Leopold Newton, of Oxton, in the County of Chester, Cotton Merchant, and John Swailes, of Oldham, in the County of Lancaster, Machinist, for the Invention of "IMPROVEMENTS IN CORKS OR STOPPERS FOR BOTTLES, AND IN MACHINERY FOR MANUFACTURING THE SAME."

Sealed the 15th April 1868, and dated the 19th October 1867.

PROVISIONAL SPECIFICATION left by the said Leopold Newton and John Swailes at the Office of the Commissioners of Patents, with their Petition, on the 19th October 1867.

We, LEOPOLD NEWTON, of Oxton, in the County of Chester, Cotton Merchant, and JOHN SWAILES, of Oldham, in the County of Lancaster, Machinist, do hereby declare the nature of the said Invention for "IMPROVEMENTS IN CORKS OR STOPPERS FOR BOTTLES, AND IN MACHINERY FOR MANUFACTURING THE SAME," to be as follows:—

Our improvements relate to corks or stoppers for bottles made of any ordinary kind of wood turned to a peculiar shape and having a cap, ferrule, or piece of common cork cemented upon one end, and my improvements in such corks or stoppers consist in making the head with flat sides instead of

making them perfectly round, and in milling the heads of the round-headed corks or stoppers, also in boring a hole in the head part of the stopper, and forming the common cork so as to be cemented in this hole.

Our improvements in machinery for the manufacture of the corks or stoppers consist in modifying and adapting that machinery to this purpose for which Letters Patent were granted to Henry Bayley, Leopold Newton, and John Greaves, Number 797, and dated he Thirtieth March in the year of our Lord One thousand eight hundred and sixty-four.

The wood blanks are prepared as described in the Specification of the said Patent, and the mechanism for reducing and shaping is made either single or double as therein described, but the boring tools and cam for operating them are dispensed with (except the head part of the stopper has a hole in it,) and cutters are applied to the slides for reducing and shaping two or more articles in each head at one operation, and when several articles are formed at one operation a concave cone centre is used to steady the end of the rotating blank, which is actuated by a cam, and this concave cone centre may be made to rotate with the blank if required; a convex cone centre may also be used within the concave centre if required. When the heads of the articles are to be milled a milling tool is made to operate at the same time that the cutting tools are acting by a cam, the movement of which may be transmitted through a spring or elastic cushion.

Another arrangement and combination of mechanism according to our Invention for shaping the articles above mentioned consists in the use of a hollow lathe spindle having a grooved conical chuck upon its end and a sliding shaft in its axis, and in the use of a hollow concave cone centre with a convex cone centre within it. The shaft in the centre of the lathe spindle and the convex and concave cone centres can slide endways, and they are actuated by cams upon a shaft passing the lengthway of the machine. Blanks in length suitable for one or more articles are prepared as herein-before mentioned, and these are placed horizontally in an inclined trough, so that the lowest will rest upon a slide with forked ends which is actuated by a cam, so as to cause the lowest blank to drop into the forks which carry it opposite to the axis of the chuck upon the lathe spindle, and in a line with the concave and convex cone centres, which advance and force it into the cone chuck, which has grooves or flutes in it that will carry the blank round with the lathe spindle, then the cutting tools which are placed upon suitable slides actuated by a cam or cams operate upon the blank, and when finished the centres will retire and the shaft in the hollow lathe spindle will force the

end of the blank out of the chuck so that it can fall away, and these operations will be repeated self-acting while there are blanks remaining in the incline feeding trough. The cork caps or ferrules are cut by crown or other cutters and they are cemented upon the points of the articles shaped in the machine above described.

Our improvements also relate to the means for facilitating the dipping of the points of the articles in the cement, which consist in passing them through holes in a plate until their heads rest upon the plate, this plate being at such elevation above the surface of the cement that the points of the articles will only just be dipped to the required depth.

SPECIFICATION in pursuance of the conditions of the Letters Patent filed by the said Leopold Newton and John Swailes in the Great Seal Patent Office on the 18th April 1868.

TO ALL TO WHOM THESE PRESENTS SHALL COME, we, LEOPOLD NEWTON, of Oxton, in the County of Chester, Cotton Merchant, and JOHN SWAILES, of Oldham, in the County of Lancaster, Machinist, send greeting.

WHEREAS Her most Excellent Majesty Queen Victoria, by Her Letters Patent, bearing date the Nineteenth day of October, in the year of our Lord One thousand eight hundred and sixty-seven, in the thirty-first year of Her reign, did, for Herself, Her heirs, and successors, give and grant unto us, the said Leopold Newton and John Swailes, Her special license that we, the said Leopold Newton and John Swailes, our executors, administrators, and assigns, or such others as we, the said Leopold Newton and John Swailes, our executors, administrators, and assigns, shall at any time agree with, and no others, from time to time and at all times thereafter during the term therein expressed, should and lawfully might make, use, exercise, and vend, within the United Kingdom of Great Britain and Ireland, the Channel Islands, and Isle of Man, an Invention for "IMPROVEMENTS IN CORKS OR STOPPERS FOR BOTTLES, AND IN MACHINERY FOR MANUFACTURING THE SAME," upon the condition (amongst others) that we, the said Leopold Newton and John Swailes, by an instrument in writing under our hands and seals, or under the hand and seal of one of us, should particularly describe and ascertain the nature of the said Invention, and in what manner the same was to be performed, and cause the same to be filed in the Great Seal Patent Office within six calendar months next and immediately after the date of the said Letters Patent.

Newton & Swailes' Improvements in Corks or Stoppers for Bottles, &c.

NOW KNOW YE, that we, the said Leopold Newton and John Swailes, do hereby declare the nature of our said Invention, and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement and accompanying Drawings (that is to say):—

Our improvements relate to corks or stoppers for bottles and other vessels made of any ordinary kind of wood turned to a peculiar shape and having a cap, ferrule, or piece of cork cemented upon one end, and our improvements in such corks or stoppers consist in making the head with flat sides instead of making them perfectly round, and in milling or fluting the head of the round headed corks or stoppers.

Our improvements in machinery for the manufacture of the corks or stoppers consist in modifying and adapting that machinery to this purpose for which Letters Patent were granted to Henry Bayley, Leopold Newton, and John Greaves, Number 797, and dated the Thirtieth March, One thousand eight hundred and sixty-four.

The wood blanks are prepared as described in the Specification of the said Patent, and the mechanism for reducing and shaping is made either single or double as therein described, but the boring tools and cam for operating them are dispensed with, and when several articles are to be formed in each head at one operation additional cutters are applied to the slides for reducing and shaping, and a concave or convex cone centre is used actuated by a cam to steady the end of the rotating blank, and this concave or convex conce centre may be made to rotate with the blank if required. When the heads of the articles are to be milled or fluted this is done in a manner herein-after described.

Another arrangement and combination of mechanism according to our Invention for shaping the articles above-mentioned consists in the use of a hollow lathe spindle having a grooved conical chuck upon its end and a sliding rod in its axis, and in the use of a hollow concave cone centre with a convex cone centre within it. The rod in the centre of the lathe spindle and the convex and concave cone centres can slide endways, and they are actuated by cams upon a shaft passing the lengthway of the machine. Blanks in length suitable for one or more articles are prepared as herein-before mentioned, or otherwise, and these are placed horizontally in a hopper or trough, so that the lowest will rest upon a slide or lever arm with forked ends which is actuated by a cam, so as to cause the lowest blank to drop into the fork, which will carry it opposite to the axis of the chuck upon the lathe spindle and in a line with the concave and convex cone centres, which advance and force it into the

chuck which has grooves or flutes in it that will carry the blank round with the lathe spindle; then the cutting tools which are placed upon suitable slides or otherwise actuated by a cam or cams operate upon the blank, and when finished the centres will retire and the rod in the hollow lathe spindle will force the end of the blank out of the chuck so that it can fall away, and these operations will be repeated self-acting while there are blanks remaining in the feeding hopper or trough. The cork caps or ferrules are cemented upon the points of the articles shaped in the machine above described.

Our improvements also relate to means for facilitating the dipping of the points of the articles in the cement, which consist in passing them through holes in a plate until their heads rest upon the plate, this plate being at such elevation above the surface of the cement that the points of the articles will only just be dipped to the required depth.

Figure 1 is an end, and Figure 2 a side sectional view of one of our improved corks or stoppers with flat sides upon the head part; Figure 3 is an end, and Figure 4 is a side sectional view of another of our improved corks or stoppers with a round milled or fluted head. x is the head part of common wood, such as ash, beech, or birch, and x^1 is a cap or ferrule of cork wood cemented upon the head part with marine glue or other suitable cement. That part of the head which enters the hole in the cork (x^1) has grooves or serrations (x^2) in it as shown to give hold to the cement. The flat sided heads shown by Figures 1 and 2 may be made by first squaring the long blank, and then taking the corners off by the mechanism for rounding the square blanks described in the Specification of the said Patent herein-before mentioned. The mode of milling or fluting the round heads, as shewn in Figures 3 and 4, will be described herein-after.

Figure 5 is a side elevation, Figure 6 a plan, and Figure 7 a detached enlarged cross section, showing a machine similar to that described in the Specification of the said Patent, but modified according to our improvements. The long blanks (W) are prepared (being rounded to the full size of the head part (x)), fed, and operated upon as described in the Specification of the said Patent, with the exceptions herein-after mentioned. The machine represented by Figures 5 and 6 is arranged to form one article by each spindle (a) at one operation, and this is done by reducing the end of the blank (w) to the shape of the intended article (x), as shown in the Figures, ready to be cut off from the blank. The cutting tools for reducing and shaping the blank are different from those described in the Specification of the said Patent, but they are mounted upon a similar slide (b^2), and are actuated by similar mechanism.

Figure 8 is a view perpendicular to the plane of the cutting and reducing tools, and Figure 9 is a side view, both views full size. c is one tool for cutting one step, and c^1 the other tool for cutting the other step, and c^2 and c^3 are two edge tools for making the side cuts, the edges of which tools are slightly in advance of the tools (c and c^1) for the cylindrical part of the article (x). The edge tools are kept at the proper guage apart by a block (c^4), and they are secured to a carrier (c^5) by a screw (c^6), which carrier is attached to the slide (b^2); the grooves or serrations (x^2) are made, and the article is cut off from the end of the blank by cutters mounted on a slide moving vertically, which slide is an addition to the machine described in the Specification of the said Patent. This slide and the cutters is shown best by Figure 7 and by Figure 10, a detached plan view; the slide (d) has two projections so as to carry two sets of cutters, those on one side for one spindle (a) and those on the other side for the other spindle (a). The cutters for the serrations (d^1) are formed with teeth, as shown, and are arranged to pass the article when the slide (d) lifts, and to cut the grooves in passing to the required depth. The knives (d^2) for cutting-off are fixed to come under and against the article when the slide is lifted. The operations performed in each head are simultaneous and not alternate as in the machine described in the Specification of the said Patent. The cams are double, that is they produce the same series of movements twice in one revolution of the cam shaft (e). Figure 11 is a diagram illustrating the form of each cam and their relative times of action; the circumference of each cam is represented in degrees of a circle by the lines marked 0 and 360, which numbers represent the same part of each cam. The form of each cam path is shown by the thick line; the feeding cam (f) begins to feed at 0, ends at 64, dwells between 64 and 85, and begins the back movement at 85 and ends at 149, and dwells between 149 and 180. The gripping cam (g) dwells between 0 and 65, causes the advances to grip between 64 and 85, dwells between 85 and 175, and draws back between 175 and 180. The cam (b) for actuating the tool slide (b^2) causes the shaping tools to retire by a movement ending at 21; there is a dwell between 21 and 50, and the cam acts to advance the shaping tools from 50 to 128, and dwells between 128 and 140, beginning the retiring movement at 140. The cutting-off cam (k) actuates the slide (d) so that it reaches its lowest position at 42, dwells between 42 and 64, ascends between 64 and 154, and begins its descent at 154. The movements produced by each cam above described are for the first half of the revolution, the same movements being repeated during the second half of the revolution. The numbers referred to are angular degrees of rotation; the levers (b^1) for conveying the motion to the slides may be actuated by separate double

cams, or one cam may be used with the cam path formed upon each side of the centre web or plate of the cam, as if two cams were placed back to back.

One improvement according to our Invention relates to the arrangements for gripping the rotating blank, and consists in placing a helical or other spring on the exterior of the spindle (a) so as to abut against a collar fast on the spindle and push against the collar (g^2), which acts upon the inclines that grip the blank, this spring having sufficient force to cause the blank to be held fast when the cutters are operating. With this arrangement a single acting cam (g) is only used to compress the spring so as take off its pressure when the blank is being fed, the forward movement to grip the blank being given by the spring alone. To apply the spring as above explained in the best manner the space between the sliding collar (g^2) and the bearing will have to be increased to the extent of two or three inches more than shown in Figures 5 and 6. The advantages of the above-described gripping arrangement are, that it allows for slight irregularities in the diameters of the blanks and reduces the friction. These advantages may be partially obtained by using a single-acting cam (g) for the gripping arrangement, and applying a spring to the cam lever (g^1), this spring giving the gripping movement to the lever and the cam the opposite back movement.

Another modification of the gripping arrangement consists in using a spring to act upon the collar (g^2) as first described, and dispensing with the gripping cam (g) by making the feeding cam and the connected mechanism strong enough to force the blank through the grippers when the feeding is to take place, the spring in this case only being sufficiently strong to hold the blank so as to carry it round when acted upon by the cutters. Any other suitable elastic grippers or holders may be substituted, acting in like manner.

Another arrangement for gripping according to our Invention, which will also flute the heads of the articles, consists in arranging a series of radiating slides in a face plate upon the end of the hollow spindle (a), these slides all meeting in the centre and forming together a circular hole. The end of each slide is toothed, and these teeth come against the blank, so that as it is forced forwards the teeth will form grooves or flutes in its lengthway. The radiating toothed slides may be fixed, or their ends may be kept pressed towards the blank, each by a strong spring giving a slight elasticity, so as to give way when a knot comes. When making one article by each spindle at one operation the cam slide and bit used for boring, as described in the said Specification, is dispensed with; but when making two or more articles by each spindle (a) at the same operation a concave or convex cone centre is

used in place of the boring bit, and the cam is formed to bring this centre against the end of the blank to steady it, and separate cams and slides b^2 and d are used for each set of reducing and cutting-off tools. The reducing tools nearest the cone centre first act, then the next reducing tools begin to act when the first are about half through the cut. The serrating and cutting off tools also act in like order, beginning at the article nearest the "centre," the articles nearest the gripping face plate being last cut off.

Figure 12 is a front sectional elevation, and Figure 13 is a cross sectional elevation illustrating another machine according to our Invention for forming articles similar to those herein-before described. For this machine the blanks may be prepared or rounded to the size of the heads of the articles required, as herein-before described or otherwise, and cut to the such lengths as will make one or more articles. In the machine illustrated the blanks are cut into lengths sufficient to make two articles. A, the feet of the machine; A^1, the bed; A^2, the spindle heastock; A^3, the centre headstock; a is the rotating spindle driven by the pulley (a^1), this spindle (a) is hollow, and has a rod (g^3) passing through it. This rod (g^3) receives end movement from a cam (g) on the cam shaft (e) through a lever (g^1) having its fulcrum at g^2, and this lever has a forked end that takes upon the rod (g^3). The rod (g^3) has a head (g^4) which fits into a recess in the end of the spindle (a), upon which a chuck (a^2) is screwed, the interior of which is slightly coned and also fluted so as to take hold of and rotate the blank when its end is forced in. This is done by a concave cone centre (h^2), which slides upon a rod (l^2) forming a convex cone centre. The concave cone centre (h^2) is actuated by a cam (h) through a lever (h^1), and the convex cone centre is actuated by a cam (l) through a lever (l^1). The blanks (W) to be fed to the machine are placed in a hopper (m) the middle part of the front of which is open, as shewn. The blanks are carried from the hopper by a two-pronged forked arm (m^1) having its bearings upon a shaft (m^2) centered upon the hopper stand (m^3), the centre of the blank when in the fork being carried by its movement in an arc which comes opposite the axis of the spindle (a), the forked arm (m^1) being curved to a radius from the centre of the shaft (m^2). Figures 12 and 13 show the fork in full line in the position in which it has carried a blank opposite to the chuck (a^2) up the end of the spindle (a), and Figure 13 shows the fork (m^1) in dotted line in the position in which it is about to take a blank (shown in dotted line) from the hopper (m). When the feeding arm (m^1) moves forward the blank is removed as the front part of the hopper (m) is cut away opposite the position of that blank, but the upper curved part of the feeding arm (m^1) prevents the descent of the other blanks

in the hopper. The forked feeding arm is actuated by a cam (f) which acts upon a bowl on a lever (f^1), the fulcrum of which is carried by a bracket (f^2) secured to the bed. To the end of the lever (f^1) one end of a rod (f^3) is jointed, the other end being jointed to an arm (f^4) on the end of the shaft (m^2) (see Figure 13). The cutters for making the grooves or serrations, and for severing the two articles (the blank being shaped, as shewn in Figure 12) are secured by an arm (k^5) upon a shaft (k^1) carried in bearings from the hopper stand (m^3), the cutter (d^1) for the serrations being fixed by a screw to a projection in front of the arm (k^5), and the cutting or severing knife (d^2) is fixed by a screw to the side of the arm (k^5). This arm is actuated by a cam (k), lever rod, and arm (k^4) in the same manner as the feeding fork (m^1). The reducing cutters are the same as those described in reference to Figures 5, 6, 7, 8, and 9, except that they are double; or there is one broad flat tool (c) in the middle, and a flat tool (c^1) upon each side of this, there being two edge cutters (c^2 and c^3) on each side of the middle flat tool (c). These cutting tools are mounted on a similar slide (b^2) to that herein-before described, which may be secured to the side of the bed, as shown in Figure 13. This slide (b^2) may be dispensed with both in this machine and in that represented by Figures 5 and 6, and the tool holder may be mounted upon and secured directly to the end of the lever acted upon by the cam (b), and thus the edges of the cutters would move in an arc having the axis of the lever (b^1) for its centre. When more than two articles are formed out of one blank at one operation it will be advisable (depending upon the strength of the material) to allow one set of reducing tools to act before the other, those tools operating first which are nearest the convex centre; the articles may then be severed from each other after being discharged from the machine by a saw or other cutters. The shape of the cams for the machine, illustrated by Figures 12 and 13, and their relative times of action are shown by the Diagram, Figure 14. The cam (g) acts form 0 to 30 to push the head of the article from the chuck (a^2), after the two articles have been severed, and the rod (g^3) is drawn back after pushing out the head of the article between 30 and 40, there being a "dwell" during the remainder of the 360 degrees of rotation. The cam (h) for the concave and the cam (l) for the convex centre move together to draw back the centres from 0 to 30, and then dwell to allow the blank to be brought opposite to the spindle, then the cam (h) at 65 begins to move the centre back to force the end of the blank into the chuck (a^2), this movement ending at 100. The cam (l) causes the convex centre to begin to follow the concave centre at 70, and it ends this movement at 110. The cam (h) dwells from 100 to 115, and then causes a slight back movement to get the concave centre clear of

the end of the blank coming to rest at 120, and then dwells during the remainder of the revolution. The cam (f) causes the feeding arm (m^1) to lift the blank from 0 to 50, to dwell from 50 to 80, then to descend partially from 80 to 120, and the cam causes the arm (m^1) from this point to move slowly back to its greatest extent so as to allow the next blank in the hopper to roll down the round corner of the arm into the carrying fork. The reducing cam (b) dwells from 0 to 120, causes the cutters to begin to approach the rotating blank at 120, ascending quickly to 195, and more slowly while cutting from 195 to 290, withdrawing from 290 to 360. The serrating and cutting-off cam (k) dwells from 0 to 270, causes the arm (k^5) to make its movement to cut from 270 to 320, and to retire from 320 to 360. The cams for the machine, shown by Figures 12 and 13, only produce one series of operations for one revolution. The numbers referred to are angular degrees of revolution, and the thick lines represent the paths of the cams. The cam shaft (e) receives motion from a wheel connected with the driving pulleys (y) in the manner shown in Figures 5 and 6. Heads of corks or stoppers, such as that represented by Figures 3 and 4, may be fluted by forcing them through a hole in a piece of steel or other metal having corresponding flutes or serrations, the entrance to the hole being slightly bell-mouthed and the hole slightly taper, the head passing first into the larger end of the hole; or the heads may be fluted or milled by causing them to rotate between two or more mills under pressure, or by means of two mills rotating in opposite directions, as represented by Figure 15 a front elevation, and Figure 16 a side elevation. p is an upright plate having a foot (p^1) secured to a suitable bench or table; this plate has bearings for two short shafts (q), one of which bearings can slide and is adjustable to and from the other bearing by a set screw (q^1). The two short shafts are geared together by two equal toothed wheels (q^2) and an intermediate wheel, the pitch lines of which are shown by peculiar dotted lines in Figure 15. On the front ends of each shaft (q) a mill is placed, one (q^3) being a little larger in diameter than the other (q^4). The head to be milled is passed into a slot in the part (q^5) just the size of the head; this part has a slot in front, as shown. As the mills turn in opposite directions, as pointed by the arrows, the head (x) of the cork will be rotated between them, and as the mill (q^3) is the largest in diameter it will slowly roll the head, so as to cause it to pass through from one side to the other. Figure 17 shows the section of a glue vessel (r) surrounded by a pan (r^1) having hot water in it. Over the glue vessel (r) a plate (r^2) is arranged, mounted upon a rod (r^3) which can be adjusted up and down. The plate (r^2) has a series of holes in it through which the small end of the cork head (x) can be passed, as shown, so

as to dip into the glue or cement to the required depth, the plate (r^2) being adjustable to regulate this as required.

We have now particularly described the nature of our improvements and the mode of carrying them into effect, and claim as our Invention,—

Firstly. Corks or stoppers for bottles or other vessels with flat-sided or round milled or fluted heads, as herein-before described and illustrated by Figures 1, 2, 3, and 4.

Secondly. The combination and arrangement of mechanism for forming at one operation in each spindle (a), one or more of the head parts of corks or stoppers, as herein-before described and illustrated by Figures 5 to 11 inclusive.

Thirdly. The improved modes of gripping and holding the blank (w), and of holding and fluting the blank, so that it will rotate with the spindle (a), and also the mounting of the reducing tools (c and c^1) directly upon the end of the lever (b^1) actuated by the cam, thus dispensing with the slide (b^2), as herein-before described.

Fourthly. The combination and arrangement of the mechanism for making the head parts (x) of corks or stoppers, as herein-before described and illustrated by Figures 12, 13, and 14.

Fifthly. The modes of fluting or milling the heads of corks or stoppers, as herein-before described and illustrated by the Drawings.

Sixthly. The arrangements for facilitating the dipping of the point ends of the head parts (x) of corks or stoppers into the cement, as described and illustrated by the Drawings.

In witness whereof, I, the said John Swailes, on my own behalf, and on behalf of the said Leopold Newton, have hereunto set my hand and seal, this Seventeenth day of April, in the year of our Lord One thousand eight hundred and sixty-eight.

JNO. SWAILES. (L.S.)

Witness,

PETER J. LIVSEY,

Patent Agent,

Manchester.

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HOLMES' Specification.

(1 SHEET)

FIG. 1.

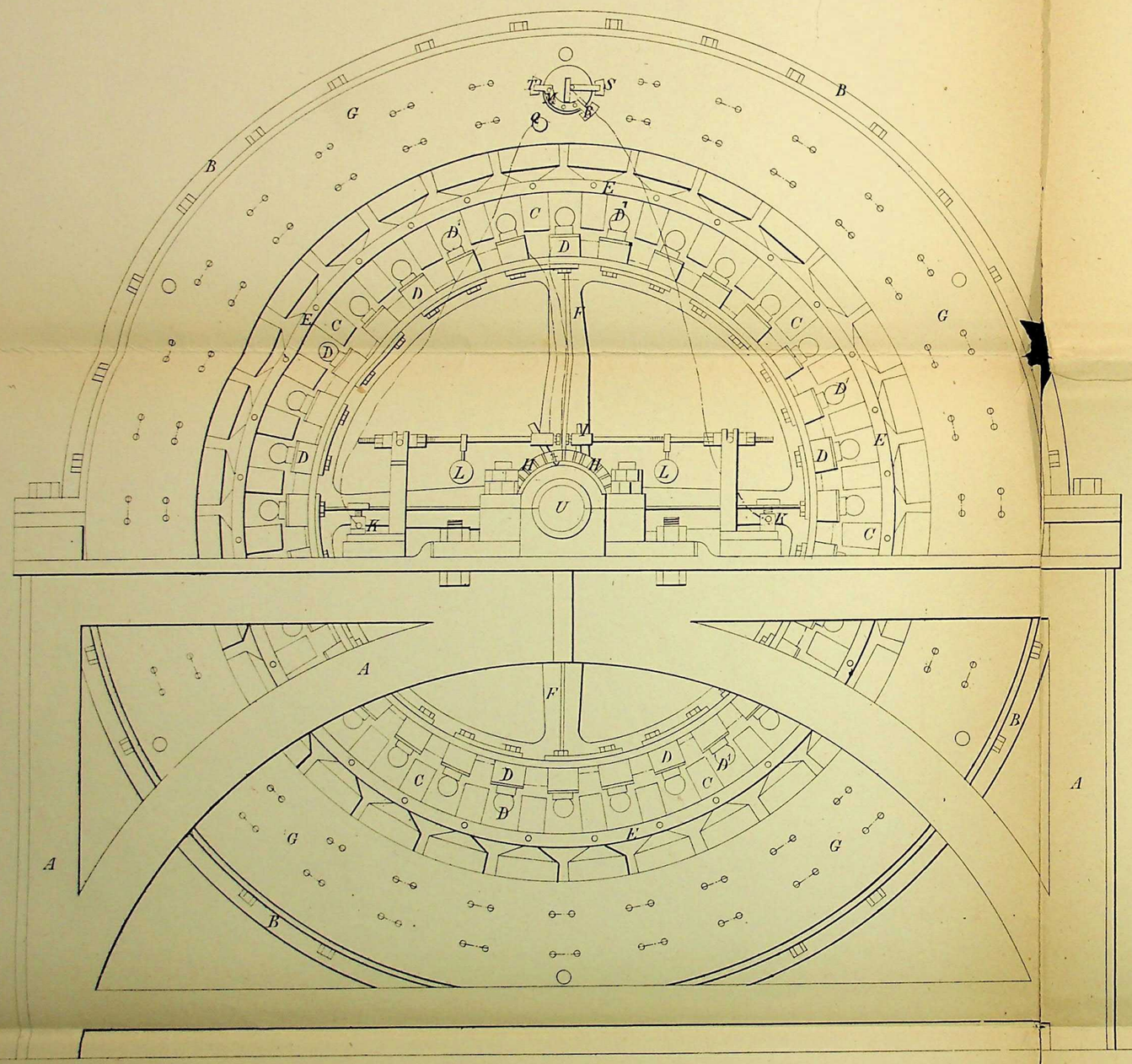


FIG. 3.

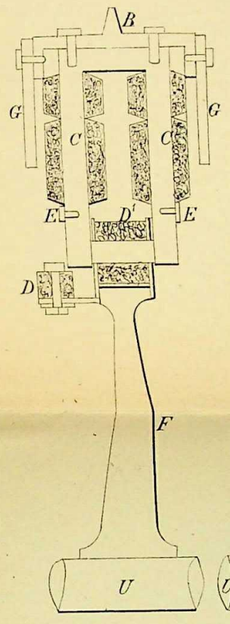


FIG. 2

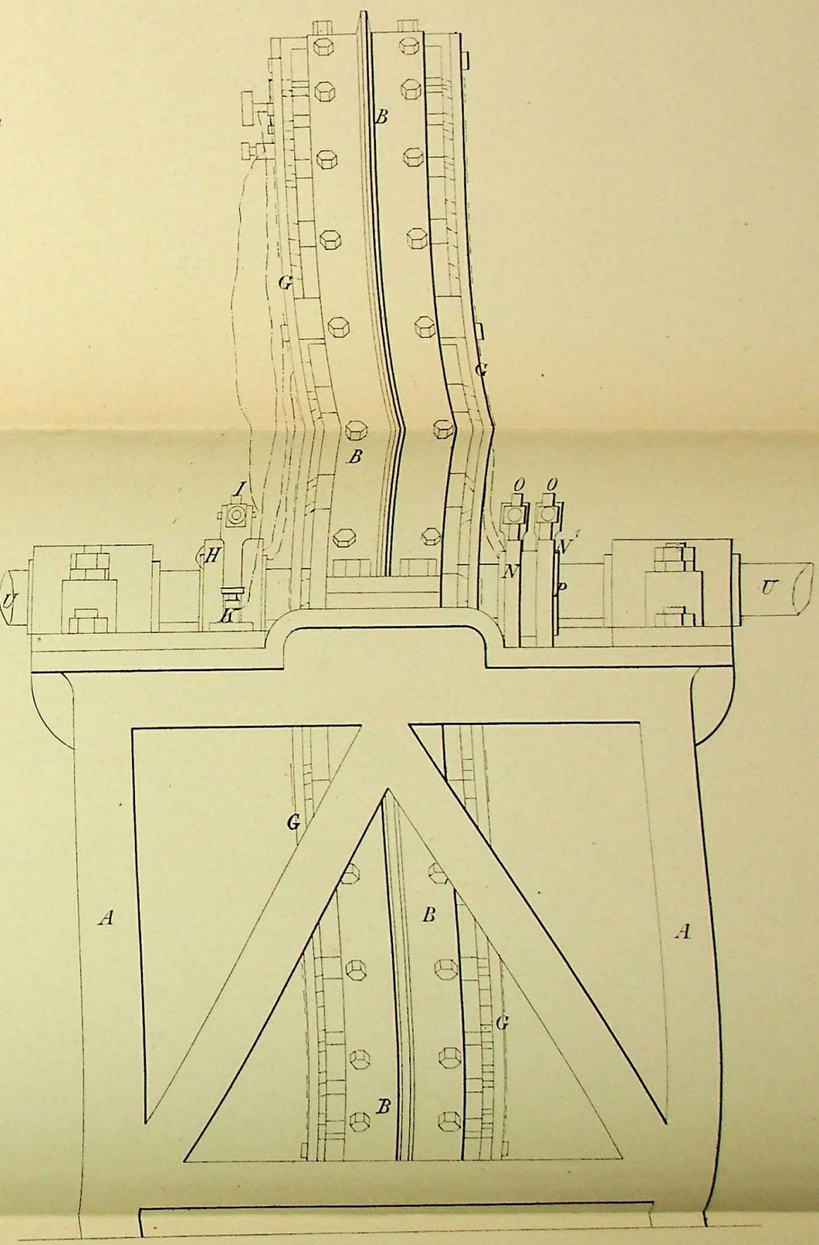


FIG. 4.

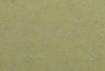


FIG. 5.

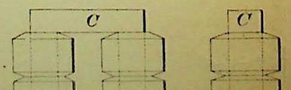


FIG. 12.

FIG. 11.

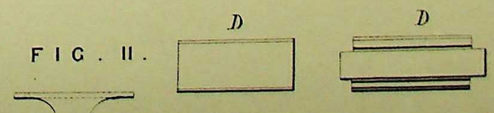


FIG. 4.

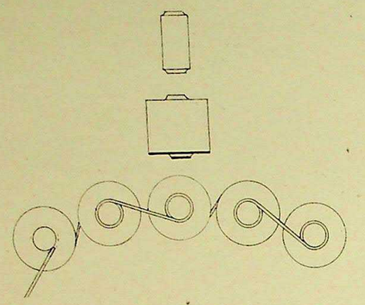


FIG. 5.

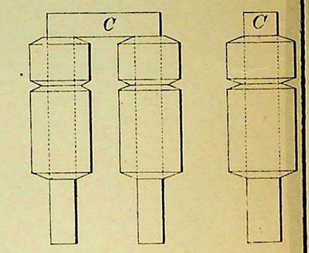


FIG. 6.

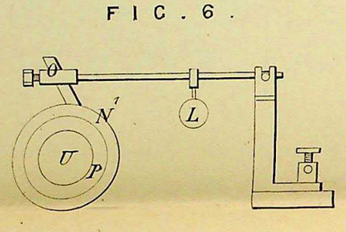
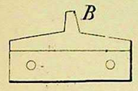


FIG. 7.

FIG. 10.



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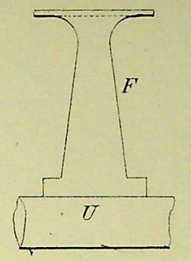

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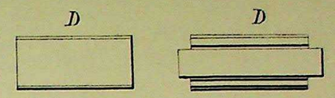

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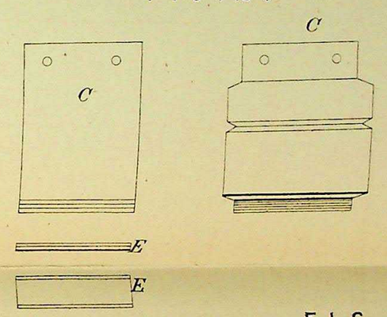

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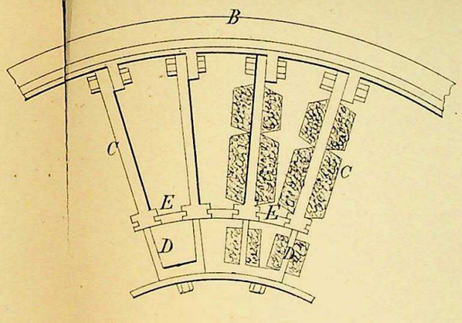

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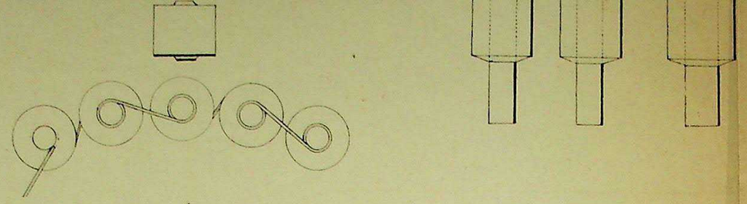

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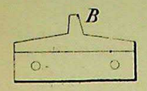

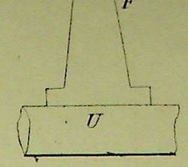

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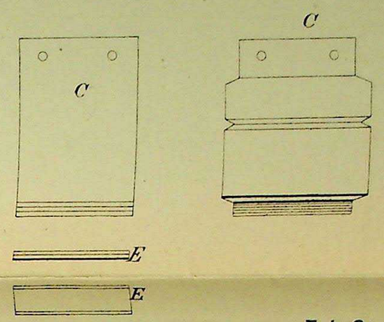

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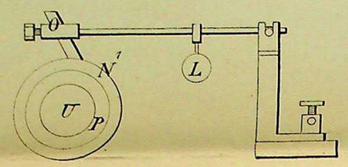

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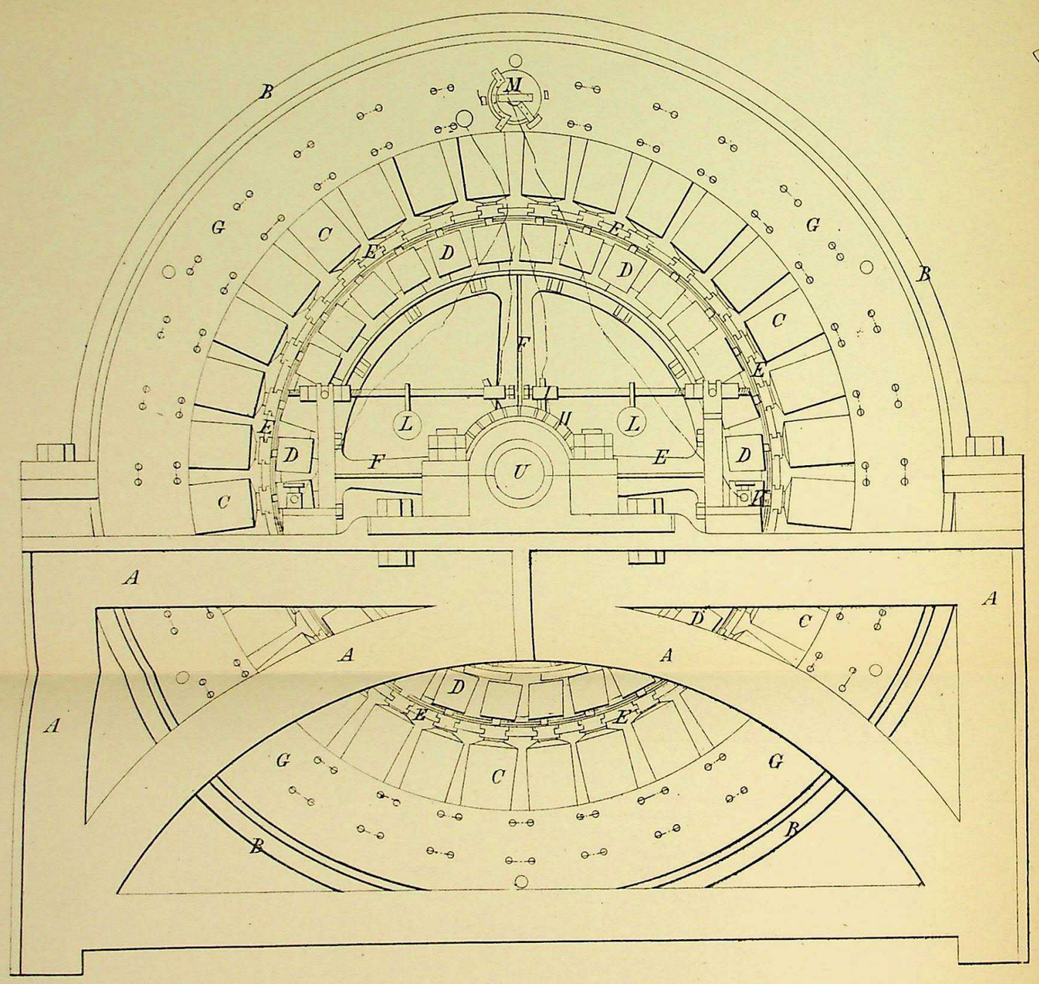

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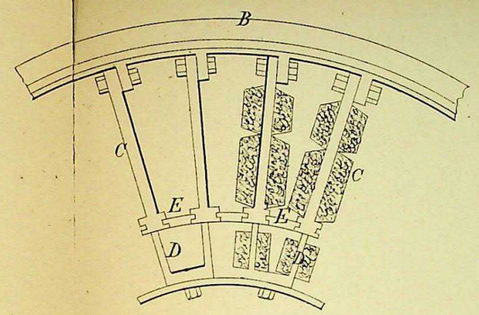

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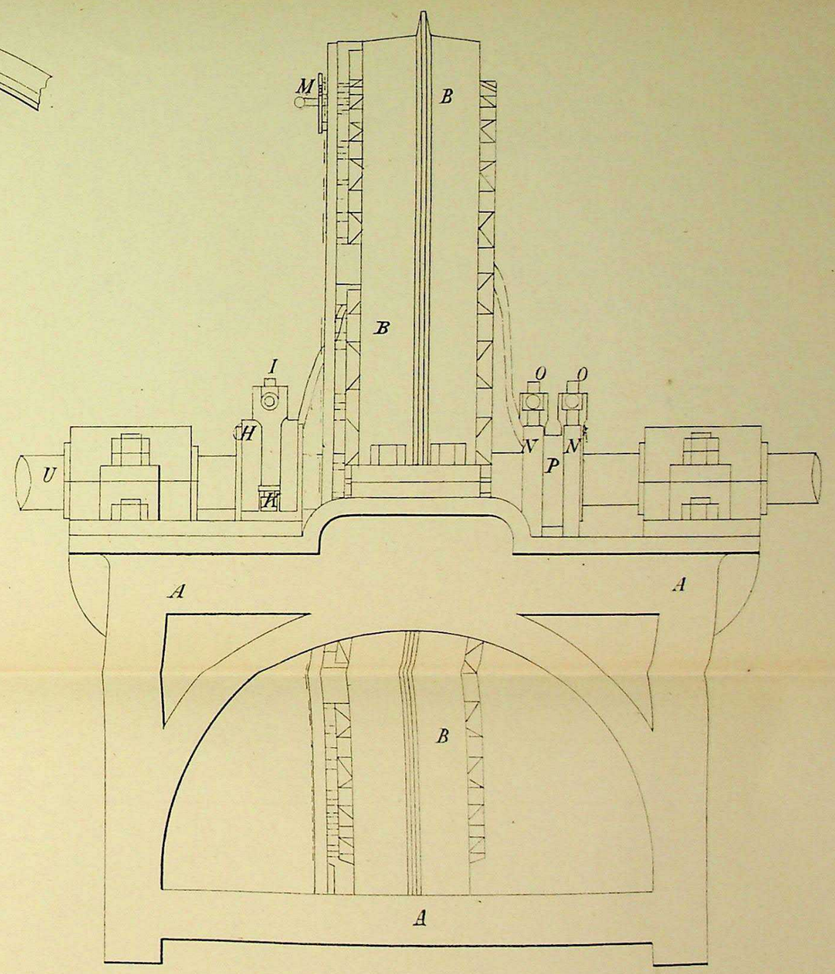

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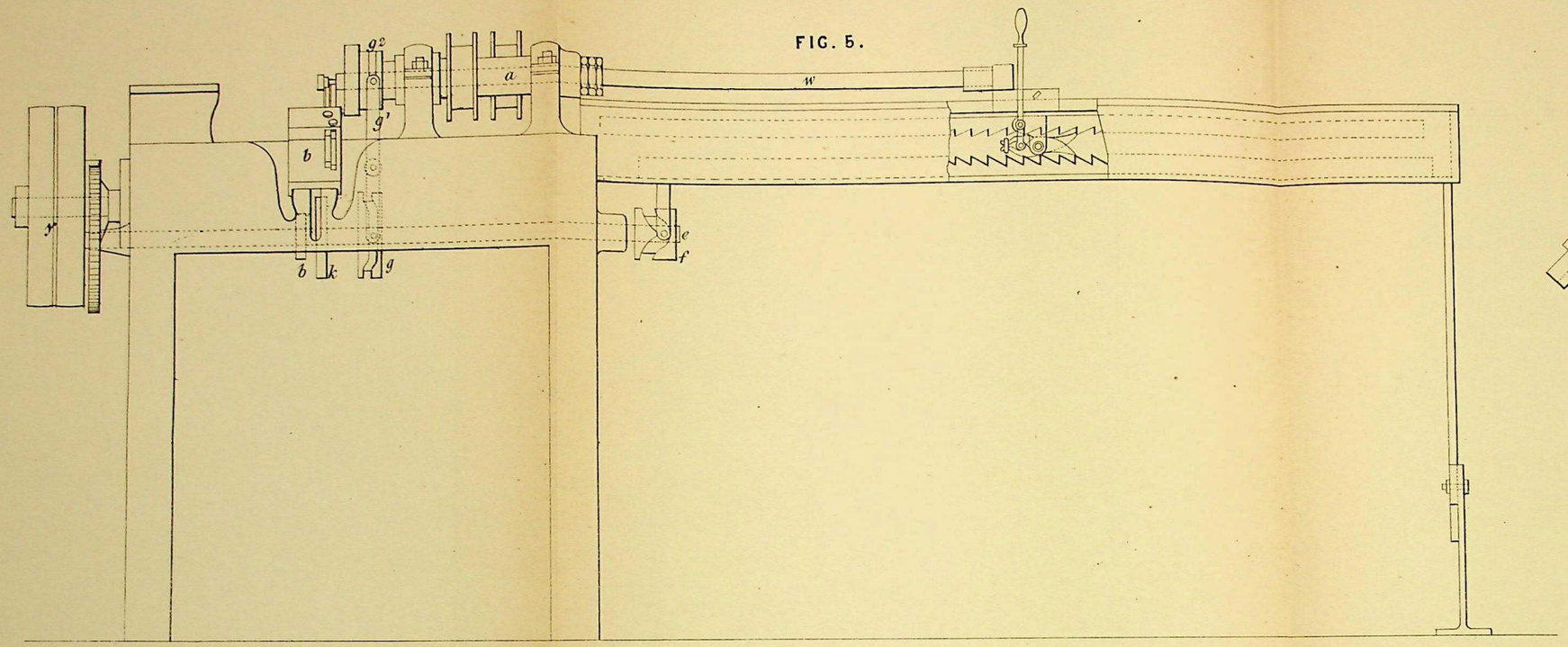
NEWTON & SWAILE'S Specification.

FIG. 5.



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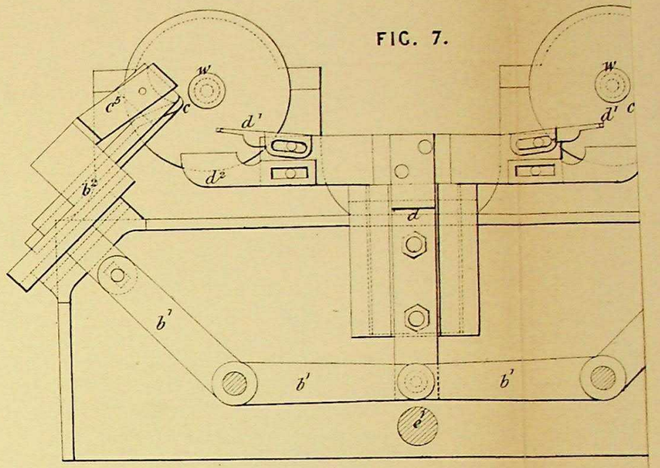

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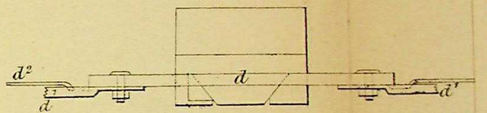

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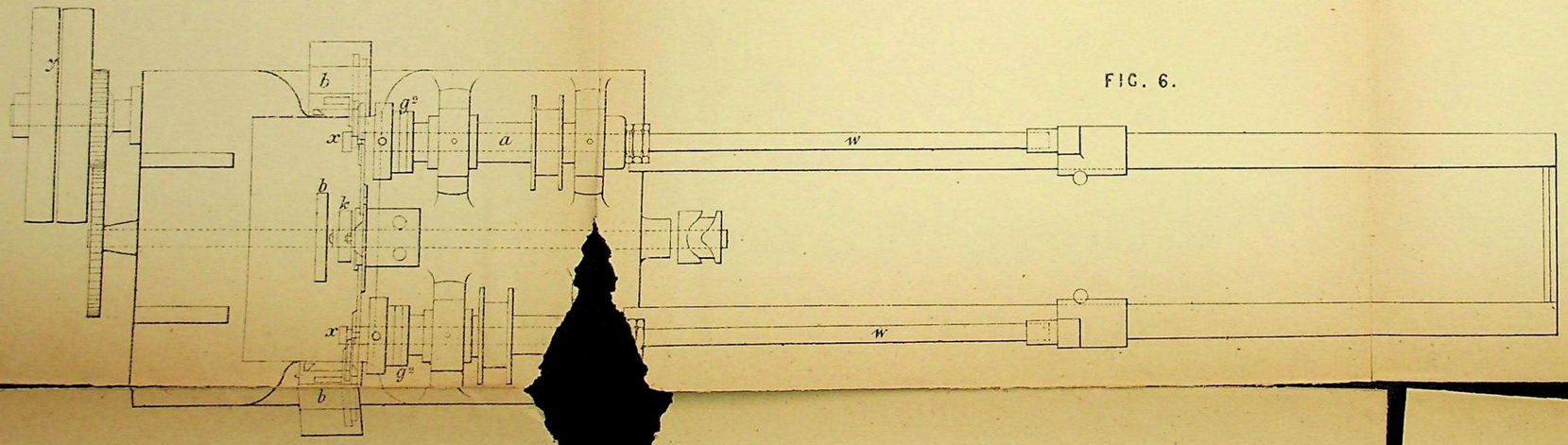

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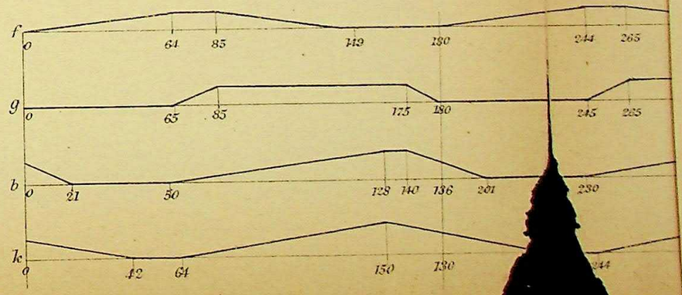

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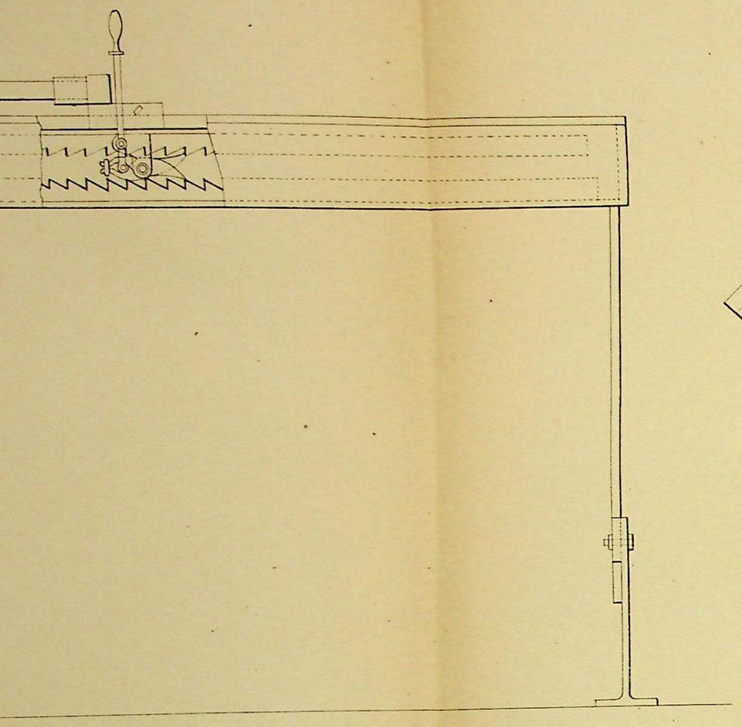

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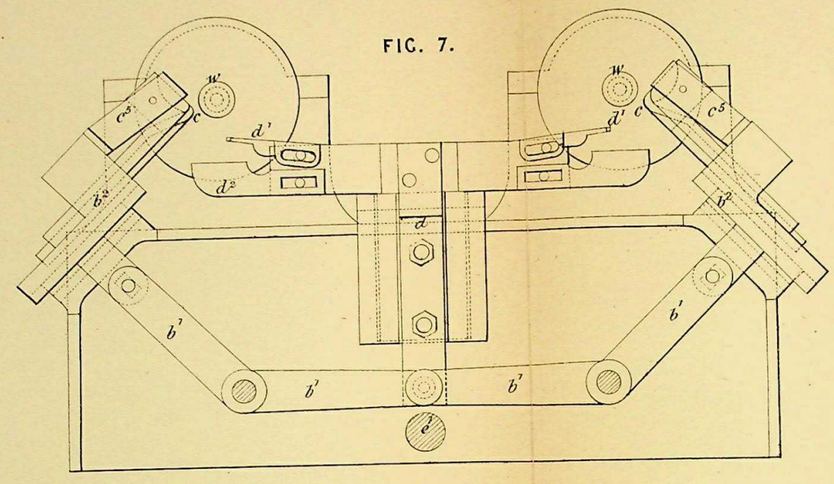

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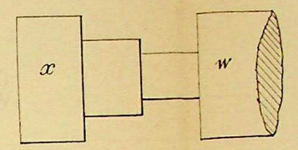

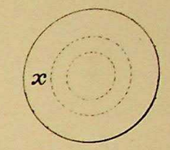

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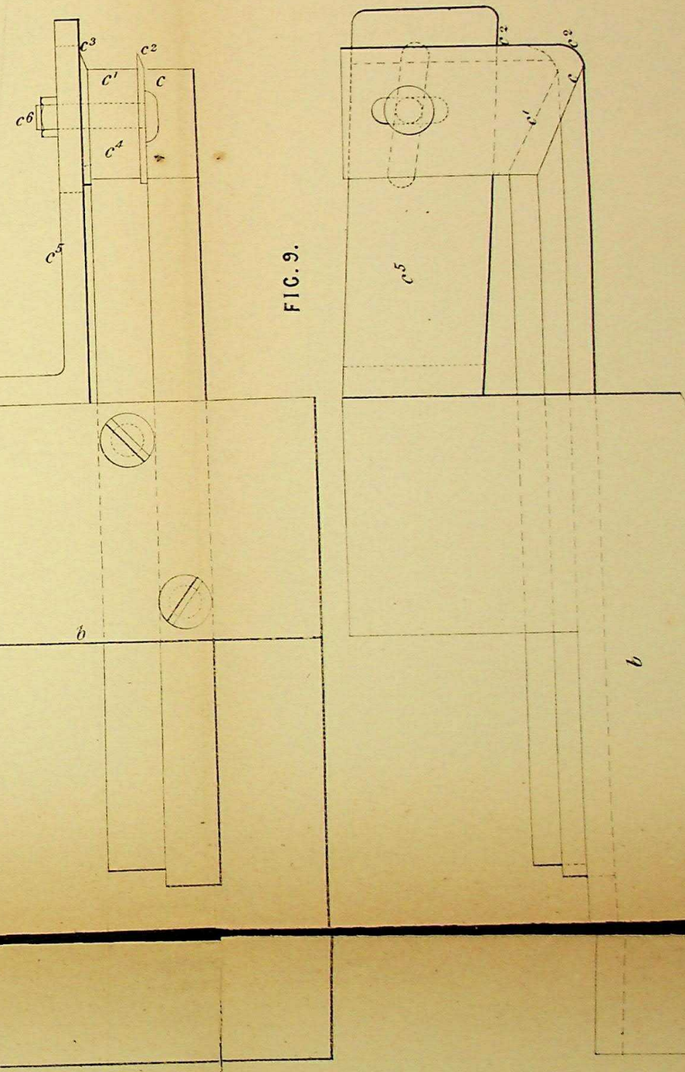

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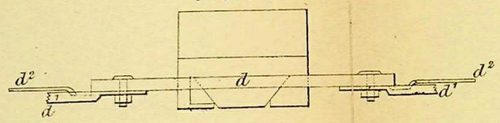

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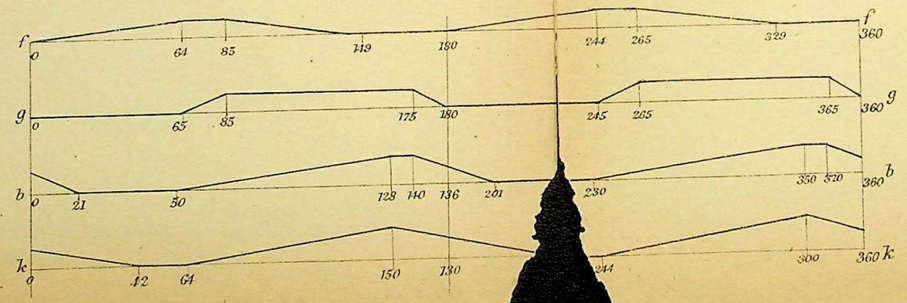
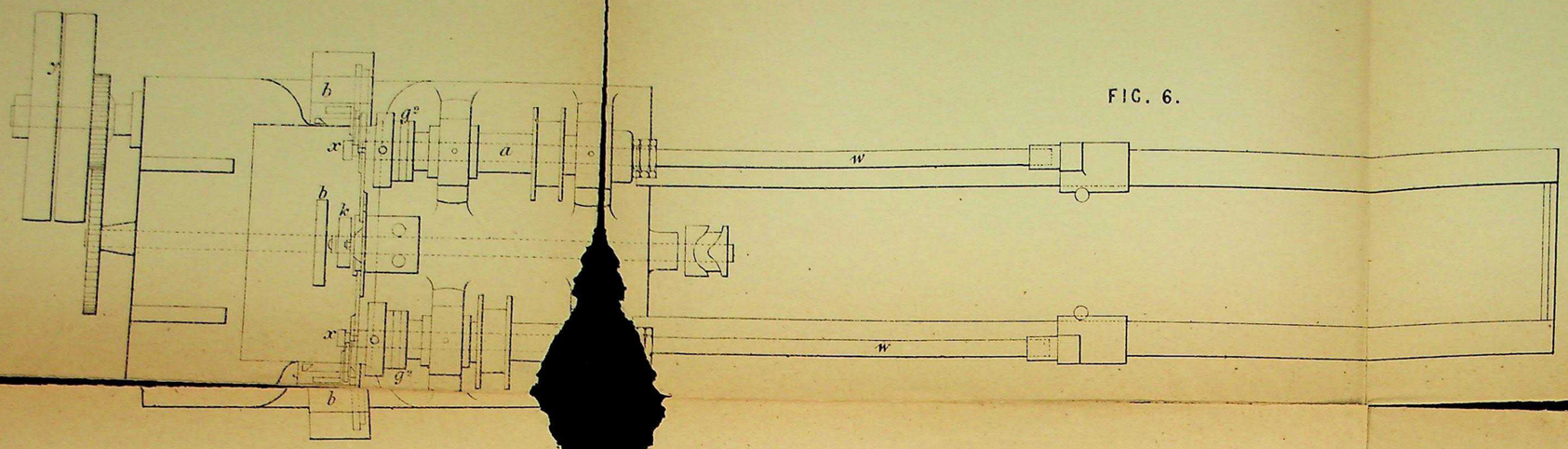


FIG. 12.

FIG. 6.



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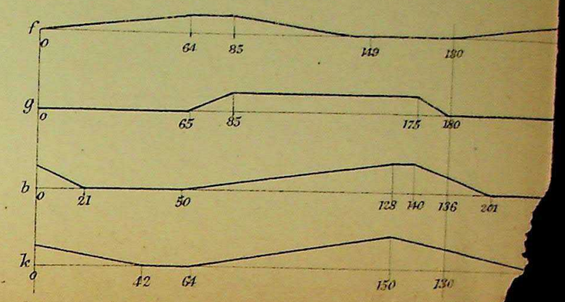

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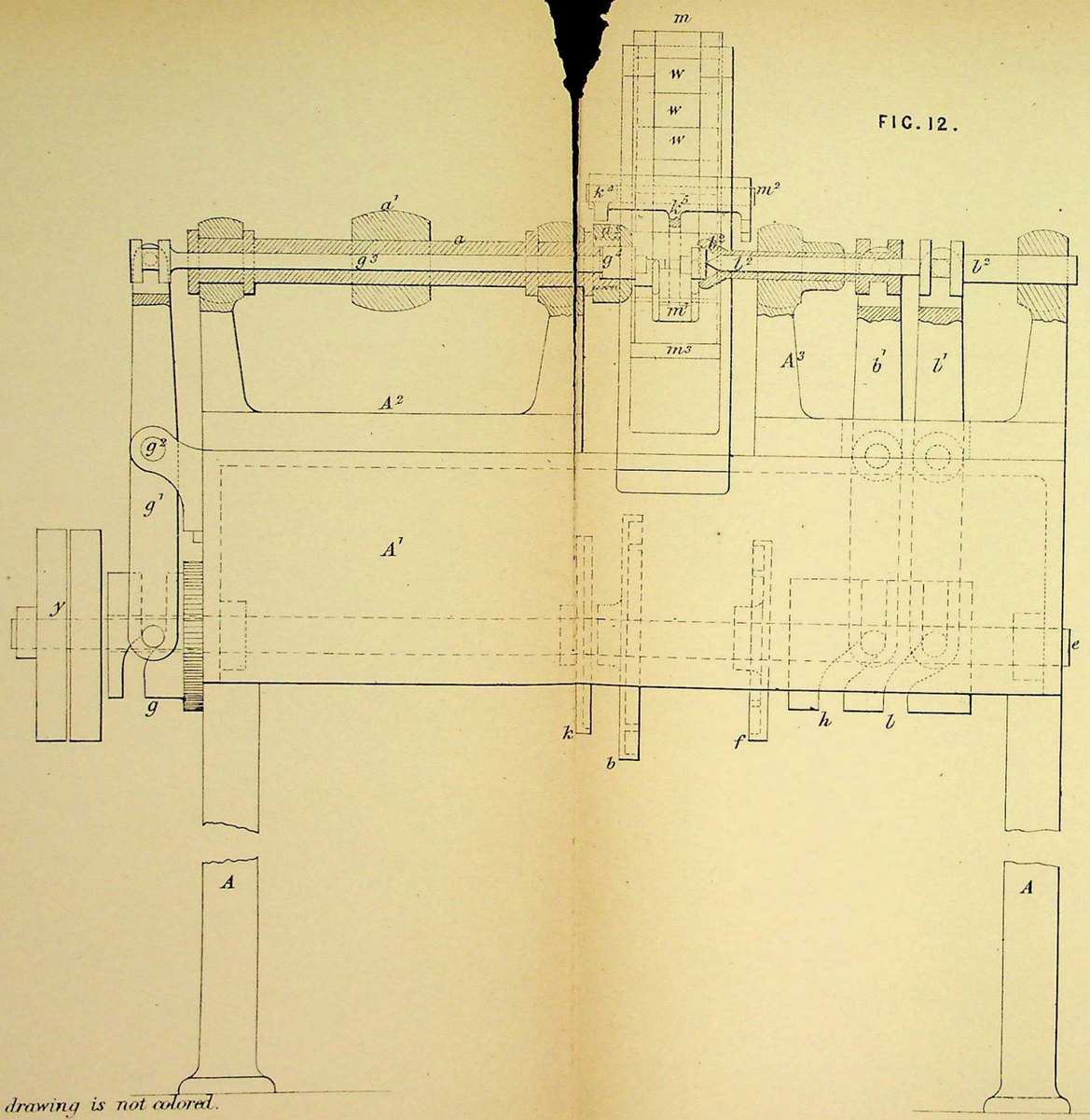

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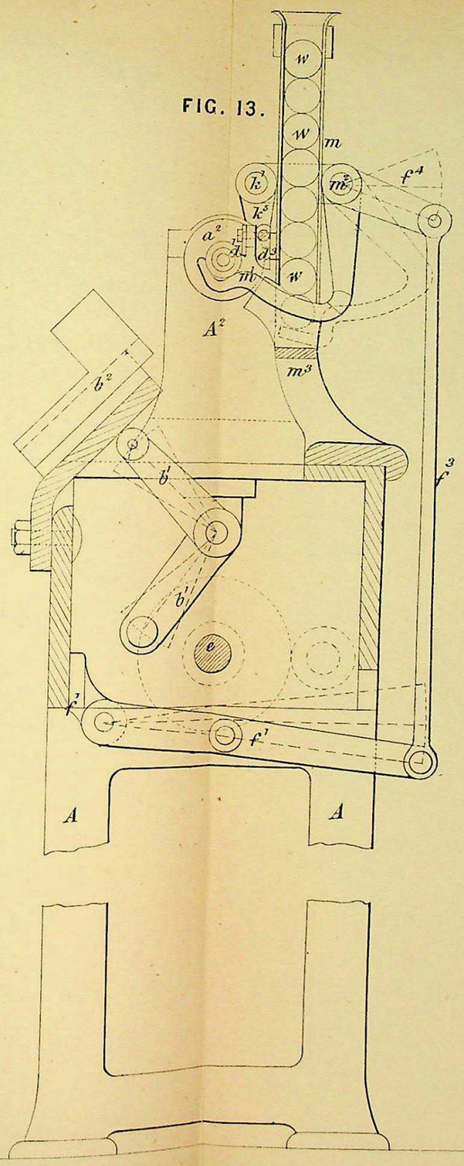

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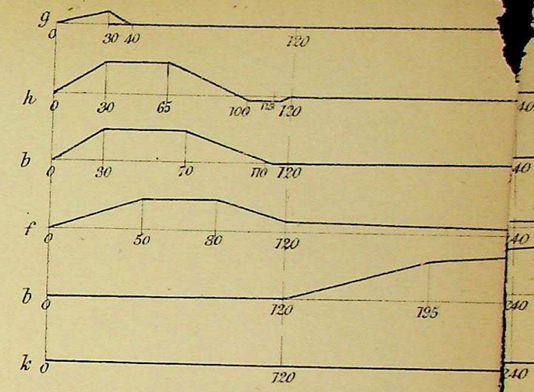

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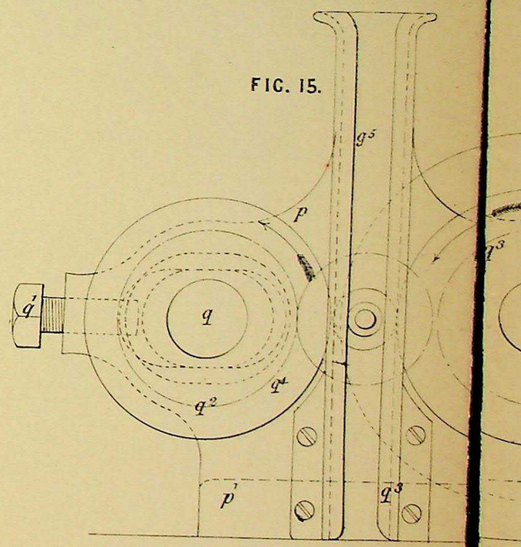

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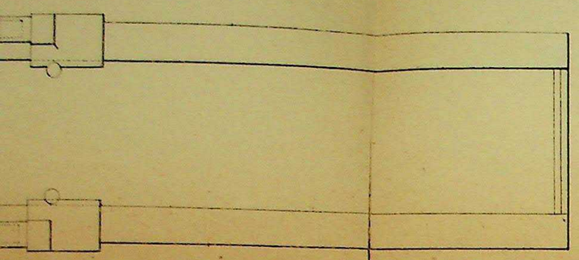
FIG. 6.



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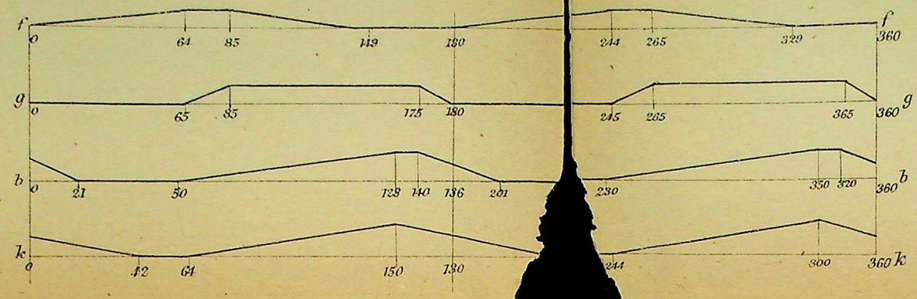

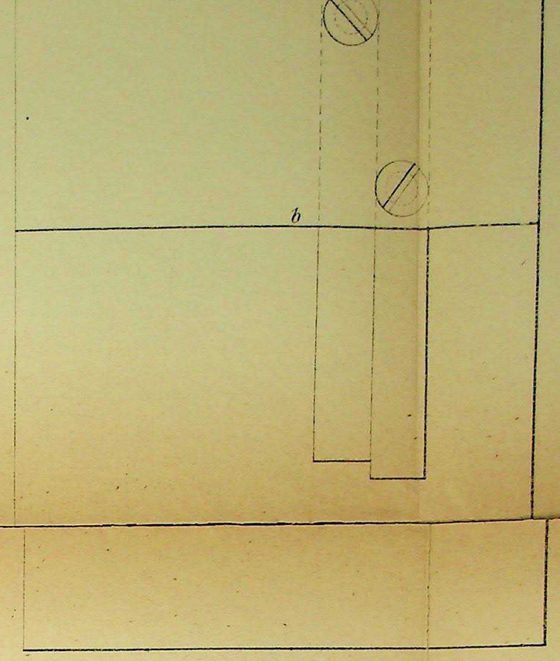

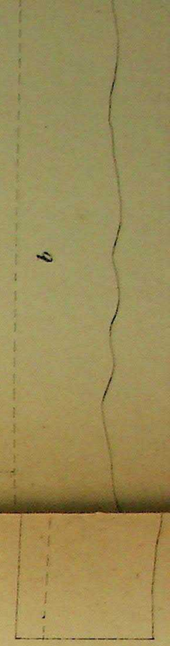

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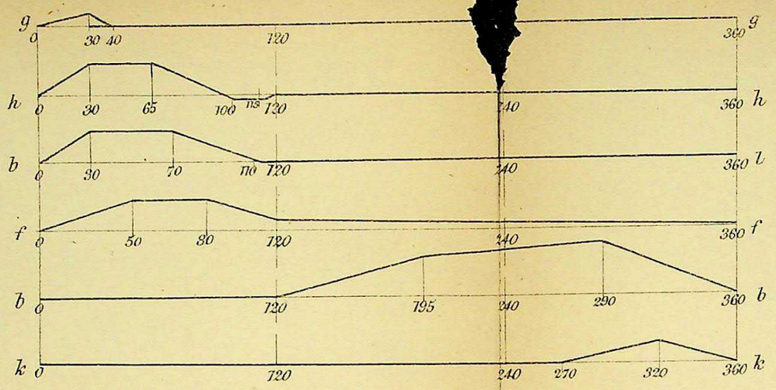
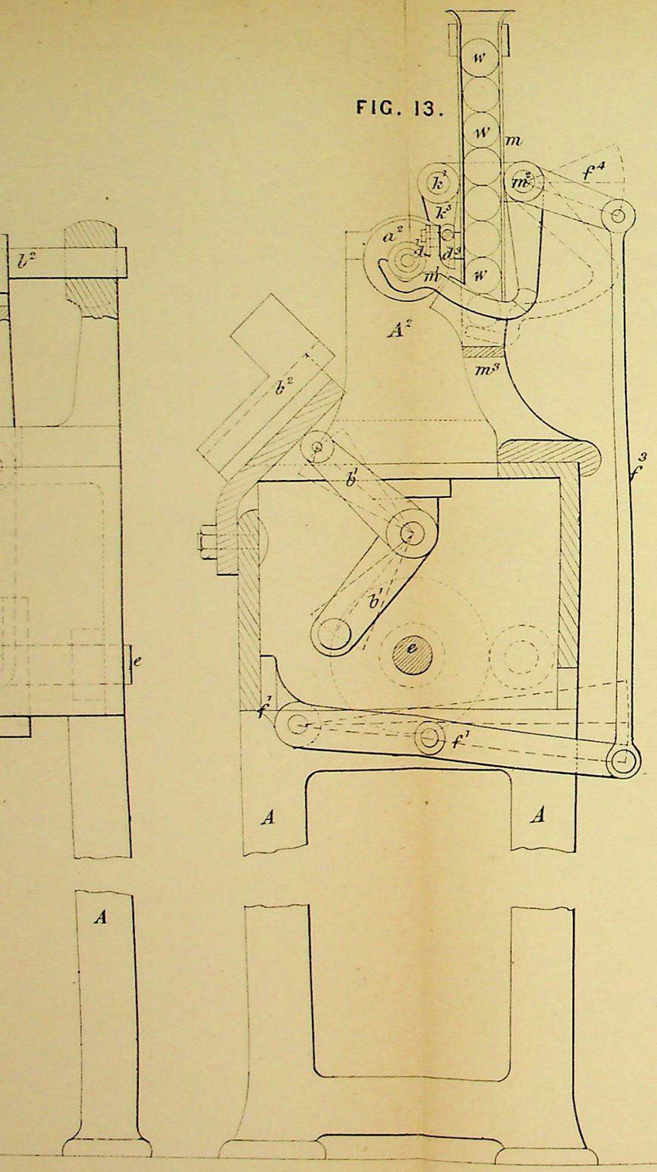


FIG. 13.



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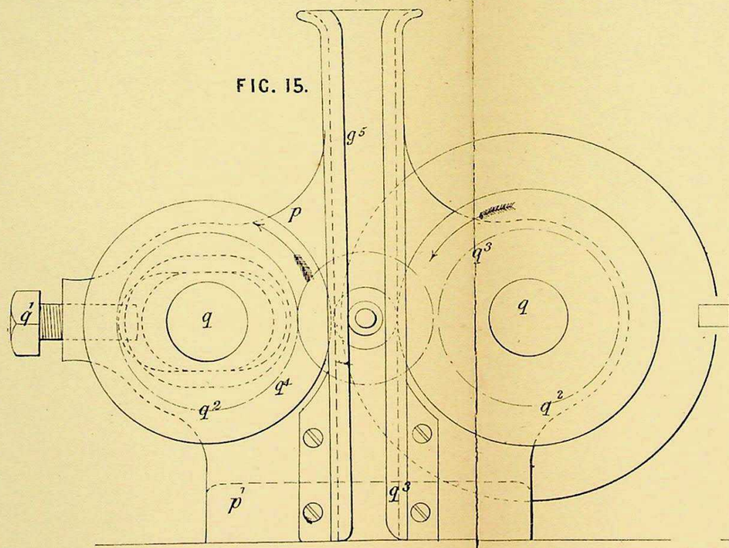

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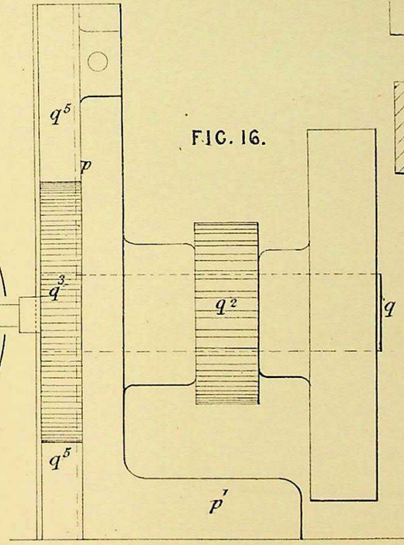
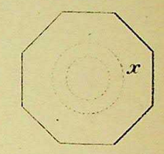


FIG. 1.



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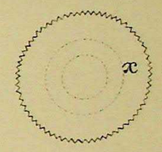

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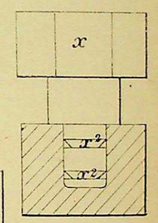

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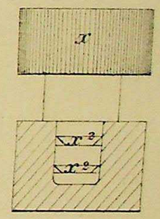

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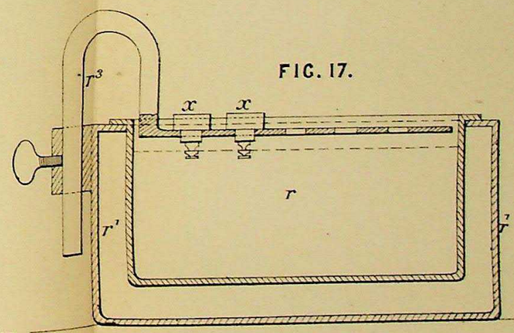

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